residue. These loads can also contain items such as cans, glass and plastic containers.

The mixed fiber loads should be pushed onto the in-feed conveyor and conveyed up to the overhead sorting platform. OCC and MP should be pulled out of the loads and dropped into bins (placed underneath the line inside the existing concrete bunkers). Containers, cans and refuse should be placed in small containers along-side the overhead sorting conveyor belt. ONP should be the only component left on the conveyor belt and should drop off the end of the conveyor into a large bin (placed inside the bunker). This ONP bin may fill two to three times during a normal compartment run. If this is the case, the line will need to be stopped for a few minutes will the bin is weighed, emptied and replaced in the bunker. Towards the end of a run, one of the managers must make sure that all materials are hand-swept onto the belt (the front-end loader cannot reach all materials with its large bucket) and that the line is clear (all materials ran through from the load). After the entire truck compartment's load is run through the system, the materials should be taken in the containers and bins (using a forklift) to the scale for weighing. Some clean-up of materials that fall outside of the bins will be necessary to make sure as much material as possible is put into the correct bins before weighing. Some materials, such as mixed paper from the Mt View residential route's mixed paper compartment can be baled directly. OCC from the Mt View OCC routes can be floor sorted for residue and then baled directly as well.

Commingled Container Line Sorting

The normal curbside processing system with the normal allotment of crew should be used for sorting the commingled container type materials from each of the loads (from individual truck compartments). The crew should consist of 6 sorters on the container line, 2 glass sorters and 2 pre-sort personnel, including the line operator. Loads of mixed containers can contain HDPE and PET plastic containers, aluminum and tin cans, glass bottles, liquids contained inside bottles and residue.

The commingled container loads should be pushed onto the in-feed conveyor and conveyed up to the overhead sorting platform. At the top of the platform, ferrous metals are pulled automatically with a ferrous magnet, a trommel screen is used to remove smaller residue and the light and heavier materials are separated with an air classifier (cyclone). The ferrous materials are automatically deposited in a bunker which needs to be emptied into wheeled-carts for transport and weighing at the end of the sort. The heavier material stream contains mostly glass bottles which are sorted by color, with mixed glass conveyed off the end of the belt. Each of these materials should be collected below the overhead sorting line in bins for weighing. In addition, the heavy materials line collects containers filled with liquids which need to be separated and carried to the scale for weighing (at the scale these containers are opened and the liquid is emptied into ½-gallon pitchers for weighing, the containers, which are mostly PET, are also weighed separately).

The lighter material stream contains plastic containers and aluminum cans. The plastic containers are sorted into two (2) fractions; HDPE colored/mixed, and PET. Each of these materials should be placed in small containers along-side the overhead sorting conveyor belt for collection and dumping into larger bins placed below the sorting platform. There should be three (3) additional bins placed under the platform for PET, HDPE, and aluminum cans. These larger bins are transported to the scales by a forklift for weighing at the end of the load's sort. Residue should be collected at several points throughout the processing line, including at the presort station, at the cyclone, at the end of the lighter fraction sort line and under the trommel.

Commercial Line Sorting

Loads from Mountain View's commercial curbside collection program should be unloaded on the Facility's main tipping floor, away from the curbside processing system. This material should be fed to the Facility's commercial processing line on a batch basis when no other waste is being processed. This should occur for the most part at the beginning of the sort day, when all equipment and bins are clean. All recovered materials such as OCC, MP, ONP, containers and scrap metals should be collected in bins and containers and weighed. The residue should not be weighed as it is too difficult to effectively capture in this system.

Residue amounts are instead calculated by subtracting the total weights of the recovered materials from the total truck load weights. The crew should consist of approximately 15 sorters including a manager.

Weighing of Samples

Approximately 20 to 40, 32-gallon and 50-gallon containers as well as 4-cubic yard 6-cubic yard bins are needed for collection of the sorted materials, and are provided by the contract processor, GTZ. At the beginning of each day, the containers and bins should be weighed on the platform scale and their tare weight tagged on the side of the container/bin using duct tape and a permanent marking pen. The markings should also contain the first-letter of the day of the week to ensure they are tared. The less bulky materials such as certain containers should be collected in the containers, the more bulky materials in bins. As mentioned previously, some materials such as mixed paper from the Mt View residential route's mixed paper compartment can be baled directly. OCC from the Mt View OCC routes can be floor sorted for residue and then baled directly as well.

Collection and Storage of Data

The data collected during the sort should be entered in MS Excel spreadsheets. Two separate types of spreadsheets were developed; one for Sunnyvale's loads, and one for Mountain View's loads to match their individual route and truck/compartment types. In addition, each sample/load should have its own sheet within the overall spreadsheet. The information should be stored on the laptop, as well as saved to a backup disc or CD at the end of each day. The on-site laptop should be protected by a plastic cover to ensure that material spillage does not affect the computer. A sample of the data collection spreadsheets are shown in Table 3 and Table 4.

Sample Shrinkage Checks

The information entered into the MS Excel spreadsheets is automatically totaled, so that comparisons between individual recyclable/residue components to the

initial total compartment weights can be made. Any shrinkage figures that appear to be out of the norm (above or below the average) for no reason should be checked during the sort to understand if and where a potential problem may exist. Some problems can be fixed using this tool. This in-field check is very important, as it is BVA's experience that errors can and do appear in the field. It is best if these errors can be found and corrected in the field.

Table 3 | Sunnyvale Sample Data Collection Form

Hauler:	SPECIALTY								
Date:									
Truck #:									
Load Type:									
Total Truck Wt.									
Wt. After 1st Unload		Compartment Type Unloaded:		Original Net Wt.	0	Total Sorted Wt.		Shrinkage%:	#DIV/0!
Wt. After 2nd Unload		Compartment Type Unloaded:		Original Net Wt.	0	Total Sorted Wt.		Shrinkage%:	#DIV/0!

Commingled Containers	Container 1		Container 2		Container 3		Container 4		Container 5		Container 6		Container 7	
	Tare	Total	Tare	Total	Tare	Total	Tare	Total	Tare	Total	Tare	Total	Tare	Total
Tin Cans														
PET														
HDPE - Natural														
HDPE - Color														
HDPE - Mix														
Aluminum Cans														
Scrap Metal														
Glass Bottles - Clear														
Glass Bottles - Green														
Glass Bottles - Brown														
Glass Bottles - Mix														
Liquid														
Residue														

Fiber	Container 1		Container 2		Container 3		Container 4		Container 5		Container 6		Container 7	
	Tare	Total	Tare	Total	Tare	Total	Tare	Total	Tare	Total	Tare	Total	Tare	Total
Old Newspaper														
Mixed Paper														
Old Corrugated Cardboard														
Residue														
Tin Cans														
PET														
HDPE - Natural														
HDPE - Color														
HDPE - Mix														
Aluminum Cans														
Scrap Metal														
Glass Bottles - Clear														
Glass Bottles - Green														
Glass Bottles - Brown														
Glass Bottles - Mix														
Liquid														

Table 4 | Mountain View Sample Data Collection Form

Hauler: FOOTHILL
Date:
Truck #:
Load Type:
Total Truck Wt.

Wt. After 1st Unload	Compartment Type Unloaded:	Original Net Wt.	0	Total Sorted Wt.		Shrinkage%:	#DIV/0!
Wt. After 2nd Unload	Compartment Type Unloaded:	Original Net Wt.	0	Total Sorted Wt.		Shrinkage%:	#DIV/0!
Wt. After 3rd Unload	Compartment Type Unloaded:	Original Net Wt.	0	Total Sorted Wt.		Shrinkage%:	#DIV/0!

Commingled Containers	Container 1		Container 2		Container 3		Container 4		Container 5		Container 6		Container 7	
	Tare	Total	Tare	Total	Tare	Total	Tare	Total	Tare	Total	Tare	Total	Tare	Total
Tin Cans														
PET														
HDPE - Natural														
HDPE - Color														
HDPE - Mix														
Aluminum Cans														
Scrap Metal														
Glass Bottles - Clear														
Glass Bottles - Green														
Glass Bottles - Brown														
Glass Bottles - Mix														
Liquid														
Residue														

Newspaper	Container 1		Container 2		Container 3		Container 4		Container 5		Container 6		Container 7	
	Tare	Total	Tare	Total	Tare	Total	Tare	Total	Tare	Total	Tare	Total	Tare	Total
Old Newspaper														
Mixed Paper														
Old Corrugated Cardboard														
Residue														
Tin Cans														
PET														
HDPE - Natural														
HDPE - Color														
HDPE - Mix														
Aluminum Cans														
Scrap Metal														
Glass Bottles - Clear														
Glass Bottles - Green														
Glass Bottles - Brown														
Glass Bottles - Mix														
Liquid														

Mixed Paper	Container 1		Container 2		Container 3		Container 4		Container 5		Container 6		Container 7	
	Tare	Total	Tare	Total	Tare	Total	Tare	Total	Tare	Total	Tare	Total	Tare	Total
Old Newspaper														
Mixed Paper														
Old Corrugated Cardboard														
Residue														
Tin Cans														
PET														
HDPE - Natural														
HDPE - Color														
HDPE - Mix														
Aluminum Cans														
Scrap Metal														
Glass Bottles - Clear														
Glass Bottles - Green														
Glass Bottles - Brown														
Glass Bottles - Mix														
Liquid														

Single Compartment	Container 1		Container 2		Container 3		Container 4		Container 5		Container 6		Container 7	
	Tare	Total	Tare	Total	Tare	Total	Tare	Total	Tare	Total	Tare	Total	Tare	Total
Old Newspaper														
Mixed Paper														
Old Corrugated Cardboard														
Residue														
Tin Cans														
PET														

Cleaning and Purging Lines

After the materials for each sample have been processed over the line, the sampling team must make sure that the lines, containers and bins are cleared so that the next load is not contaminated. Areas around the line should be picked up and swept as necessary to maintain "cleanliness" in the area.

Management of City Staff and Contract Operator

The Contract Operator should supply the Management Team with a field manager to coordinate all operations, such truck receiving and weighing, sorting operations, forklift and front-end loader coordination, weighing operations, etc.

Summation and Statistical Analysis of Data

The data output from the sample sheets should be summarized showing material composition by City, route type (i.e., commercial, residential, etc.) and truck compartment type (incoming material stream). Statistical calculations should be made including the mean, standard deviation and the margin of error at a 90% confidence level.

City Spreadsheet Linkage

All relevant information gained during the field sampling and aggregated as described above, should be linked directly to Sunnyvale's spreadsheet for distribution of the representative share of revenues and costs between Mountain View and Sunnyvale.

Appendix B

Smart Station Source Separated Materials Characterization Study Training Manual English

Smart Station Source Separated Materials Characterization Study Training Manual

I. Introduction

The purpose of the study is to characterize the source separated materials delivered to the SMaRT Station to more effectively and consistently determine the allocation of revenues between the cities of Mountain View, Palo Alto and Sunnyvale.

II. Pre-Field Sort Preparations

Determination of Number of Samples

1. Use California Solid Waste Industry Guidelines to determine the number of samples as applicable (CIWMB recommends 15 to 50 samples depending on study and population type)
2. Based on the number and type of routes and total tonnage in 2003, 20 samples per city for a total of 40 samples were taken

Contract Hauler Coordination

A meeting with the contract haulers early in the process is necessary to ensure an effective and efficient study; outline the responsibilities of the contract hauler.

1. A list of routes with load type, pick-up day, route numbers, truck numbers, and SMaRT numbers should be collected
2. A map of all the routes showing geographical pickup areas by day is also needed
3. Management team and contract haulers will work to develop a chart of routes and days that need to be targeted for the study
4. Contract haulers and management team must work with vehicle drivers and scale house operators to ensure that the collection vehicle is the

correct route, the delivery time is accurate, and that vehicles use proper weighing procedures

Sample Selection

1. Crucial to have a representative and directly proportional sampling of the normal truck routes in both the cities
2. Review each hauler's route lists and maps showing number of normal routes including the type (e.g. residential, commercial, OCC) and geographical coverage
3. Calculate the number of sample loads by generator type through understanding the percentage of each route types. For example, if a city has 100 total routes and 45 are residential, 45% of the sample load should be residential loads. Using the base case of 20 loads, 45% would equal 9 residential routes; some rounding of these calculations will be necessary as a "whole" number for sampling is needed (e.g. for Sunnyvale's MF loads, approximately 19% of the 20 total samples was calculated to be 3.75 samples required, since this is not possible, the 3.75 was rounded to the "whole" number of 4)
4. Randomly select the daily loads that are of the number and type required (see above) and that give geographic representation; the random selection is conducted as follows:

   Route maps are collected from each hauler; the haulers cover a different geographical area each day. If two residential routes are required from an area that has 6 running that same day, two must be selected randomly. To do this, take the daily list of routes and route numbers, note a 1 to 6 next to each of the six route numbers for that day. Use the random number generator in MS Excel. The function is called RAND. If there are 6 possible route selections multiply the random number generator number by 6 (i.e. =RAND*6). Make sure you format the cell referenced to zero decimal places. The random number generator will pick one of the routes 1 to 6 for you. For the second choice, simply recalculate in MS Excel by hitting F9; it will yield the second random choice.

Sample Logistics

Management team, sorting crew, and contractor must have an initial meeting to determine the best plan of action to most effectively minimize the impact to daily operations. Suggested sampling logistics include:

1. Two weeks (10 business days) to conduct sampling of 40 loads; average of 4 loads per day
2. Estimated one hour per load for sorting, weighing and recording
3. Coordination with contract haulers to hold loads overnight and deliver them the next morning, if needed
4. Study samples should be scheduled for delivery before normal day-to-day operations begin

Assemble Team

1. Team should consist of the same number of sorters that perform day-to-day operations, preferably the team that performs this function on a daily basis
2. Team should be scheduled and assembled through discussions with managing representative for the contract processor; contract manager needs to assign one responsible manager from their crew for all direct coordination on a daily basis
3. Three managers are required in the following positions: 1) manage weighing and data entry at the scales, 2) manage operations on the floor, and 3) manage operations above on the sorting platforms

Sampling Team Training

1. Training materials should be distributed in both English and Spanish prior to training
2. One-half to one hour of time should be allocated to a training session on the first day of the sort

3. Sampling team will meet prior to the arrival of the first truck and receive training in both Spanish and English covering the following topics:
    a. Overview and purpose of the study
    b. Differences in study sort activities from normal daily sorting routine
    c. Review safety aspects involved in differing sorting activities

Equipment

The following equipment will be required during the sort:

- Sort lines
- Baler
- Containers
- Bin
- Gloves
- Safety vests
- Hard hats
- Flagging tape, duct tape, marking pens, clip boards, note paper, pens, pencils, scissors, stapler, etc.
- Other safety equipment, as needed
- Laptop computer with Excel spreadsheets

III. Field Sort

Pre-sort checklists for both the mixed containers and fiber processing lines are attached as tables 1 and 2, respectively.

General Preparations

At the beginning of each day, there are several tasks that must be accomplished prior to the receipt of the first load. These tasks are measures to ensure the accuracy of the study.

1. Set up table, plug in laptop computer, get note sheets ready on clip boards, etc. for the day
2. Zero out scale; clean around scale areas
3. Tape off areas on sorting platforms that sorters should not sort into; for container line tape one strip of caution tape across all normal bunker openings; for fiber line put caution tape over bunker chutes not in use (third and fourth bunker from in-feed, these will be used for storage)
4. Check all lines to see if clear including all in-feeds, conveyor systems, sorting line containers, floor bins, bunker areas
5. Have crew clean up and sweep around all conveyor systems
6. Check tare weights on all containers and bins; apply duct tape to containers/bins and add with permanent marker the first letter of the day and the tare of the container/bin
7. Ensure that if bales are located on the balers, the last bale is marked to designate where the study loads will begin
8. Place three (3) extra bins for sort under/adjacent to the containers sorting line; these bins include: (1) aluminum cans, (2) PET, and (3) HDPE.
9. Tie off residue screening material at bottom from air classification system; not much residue is gathered per run and can easily be untied and emptied into a small container at the end of each run

Vehicle Receiving and Weighing

1. Receiving and weighing of all vehicles is done in the same manner as performed on a daily basis
2. Entire vehicle will be weighed fully loaded, and weight recorded
3. Continue until all compartments are weighed, emptied and recorded
4. Final tare weight of vehicle will be taken and recorded
5. All weights are taken on the large in-floor truck scale (accuracy +/- 20lbs)

Collection and Storage of Data

1. Data collected in two Excel spreadsheets: one for each city 1) Sunnyvale and; 2) Mountain View
2. Each sample load has its own spreadsheet
3. Information to be stored in laptop and backup discs at the end of each sort day
4. Computer should be covered with plastic for protection from material spillage

Sample Shrinkage Checks

1. Spreadsheets will automatically total the shrinkage percentage once the sorted components have been weighed and recorded
2. Shrinkage figures that are roughly out of the norm and can't be explained will be checked at the end of each truck compartment run, with errors corrected as applicable
3. This "in-field" check allows for instant identification and possible correction of errors

Sorting Procedures

Materials will be sorted using three separate lines as in normal daily operations. The sorting procedures should replicate normal operations as close as possible including use of the same stationary and mobile equipment, use of the same number and types of personnel, etc.

Cleaning and Purging of the Lines

It is essential for the integrity of the study that the lines, bins, containers and working areas be cleaned and purged before commencement of each sort load. Managers should conduct a visual inspection prior to the start of each sampling load.

IV. Specialty (Sunnyvale) Vehicles

Specialty uses two compartment trucks for all source-separated collection routes including single-family residential, multi-family residential and city/schools. The truck compartments contain newspaper and containers.

Newspaper Compartment – Sorted Over Fiber Line

1. Fiber loads target to include old newspaper (ONP), old corrugated cardboard (OCC) and mixed paper. Other materials such as mixed containers and residue, which can be sorted into separate small containers next to the sort line, are often found in these loads.
2. Load are pushed onto the in-feed conveyor belt by a front-end loader and conveyed to the overhead sorting platform. Towards the end of a run, someone should be assigned to sweep the leftover materials onto the conveyor to ensure the entire load is processed (materials inaccessible by front-end loader).
3. OCC and mixed paper are first sorted off the line and deposited in bunker chutes, which contain one to two large bins for collection. Some materials fall on the floor and will need to be swept up and placed back into the appropriate bins at the end of the run.
4. ONP falls off the end of the conveyor into a large bin. Most likely the sort line will need to be stopped one to two times during the run when the large newspaper bin fills up. At this time, the bin should be weighed, recorded, dumped, and located back under the bunker chute to continue the sorting process.
5. As discussed, containers may also inadvertently be placed by residents into the fiber load and should be sorted off the line into containers located next to the sorters. This happens most frequently with the multi-family routes. Sorting crew members will need to separate the containers found in the fiber loads into the following classifications (this can be done on the floor area adjacent to the scale):
    - HDPE
    - PET
    - Mixed glass
    - Aluminum Cans
    - Tin
    - Residue

6. At the completion of the fiber line sort, sort crew members will need to sweep up materials that have fallen on the floor and place them into the appropriate bins.
7. All OCC, mixed paper bins and the separated containers must be weighed and recorded. Once all the materials are weighed, the shrinkage numbers should be examined to see if it appears the weights are reasonable.

Commingled Container Compartment – Sorted Over Containers Line

1. Commingled container loads can include mixed HDPE and PET plastic containers, aluminum and tin cans, glass bottles (clear, green, brown, and mixed), liquids (contained in bottles) and residue
2. Loads are pushed onto the in-feed conveyor belt by the front-end loader and conveyed to the overhead sorting platform. Towards the end of a run, someone should be assigned to sweep the leftover materials onto the conveyor to ensure the entire load is processed (materials inaccessible by front-end loader).
3. Commingled containers are conveyed through a trommel screen where small residue materials drop out into a small residue bin.
4. Materials pass under a magnet and collected ferrous metals are deposited into a cage-type bunker.
5. Materials pass through an air classifier (cyclone), where materials are divided by weight into a "heavies" component (mostly glass and liquid containing PET bottles) and a "lights" component (mostly plastic and aluminum containers).

Heavies

6. Sorters separate the glass by color (green, brown or amber, and clear) in to bins located below. The remaining glass (mixed color) will be conveyed off the end of the sort belt into a bin located below the platform
7. Additionally, PET bottles containing liquids are sorted into a separate container. Upon completion of the sort, the sort crew will need to empty

the liquid from the containers into separate pitchers. Both the empty PET containers and the liquid will need to be weighed and recorded.

Lights

8. The remaining materials are conveyed over the platform sort line and mixed HDPE, PET, and aluminum cans are sorted off the line and placed in containers next to the sorters.
9. Residue falls off the end of the line into a large bin.
10. During the run, as they fill, the small mixed HDPE, PET and aluminum can containers, located next to the sort belt will be dumped over the platform into large bins below. This is an area where safety is critical; sorters must be careful in dumping these containers and no personnel should be allowed under the sorting platform during a run. In addition, if possible, one extra person should be made available for dumping duties so as not to take away from normal sorting procedures.
11. Sorting crews will need to pick up inadvertently dropped materials around the bins and place them into the appropriate bins for weighing
12. The forklift driver will then pick up each of the container bins and have the bins weighed.
13. Additionally, sort crew will need to remove ferrous materials from caged bunker and place them into rolling carts to be transferred to the scales and weighed.
14. All containers and bins are to be weighed and recorded. Once all the materials are weighed, the shrinkage numbers should be examined to see if it appears the weights are reasonable (i.e. within study norms and are explainable).

V. Foothill (Mountain View) Vehicles

Foothill uses three compartment trucks for residential solid waste collection; these compartments contain: 1) mixed paper 2) ONP and; 3) commingled containers. Foothill does not distinguish between single-family or multi-family loads. Additionally, Foothill uses one compartment vehicles for collection of OCC and commercial routes. Each of these loads is handled differently.

Residential Vehicle Mixed Paper Compartment – No Sorting, Just Baled

Unlike Sunnyvale, the Mountain View collection program separates mixed paper from the ONP. Due to the curbside source separation, the handling of the compartment load is as follows:

1. Mixed paper compartment is dumped on the sorting floor.
2. Mixed paper is pushed into an empty bunker by the front-end loader where it is then baled, and the bales are weighed and recorded.

Residential Vehicle ONP Compartment - Sorted Over Fiber Line

1. ONP loads mostly ONP, some mixed paper and a small amount of mixed containers and residue.
2. Load are pushed onto the in-feed conveyor belt by a front-end loader and conveyed to the overhead sorting platform. Towards the end of a run, someone should be assigned to sweep the leftover materials onto the conveyor to ensure the entire load is processed (materials inaccessible by front-end loader).
3. Mixed paper is sorted off the line and deposited in a bunker chute, which contains one to two large bins for collection. Some materials fall on the floor and will need to be swept up and put back into the appropriate bins at the end of the run.
4. ONP falls off the end of the conveyor into a large bin. Most likely the sort line will need to be stopped one to two times during the run when the large newspaper bin fills up. At this time, the bin should be weighed,

recorded, dumped, and located back under the bunker chute to continue the sorting process.

5. As discussed, containers may also inadvertently be placed by residents into the ONP load and should be sorted off the line into containers located next to the sorters. Sorting crew members will need to separate the containers found in the fiber loads into the following classifications (this can be done after the run on the floor area adjacent to the scale):
   - HDPE
   - PET
   - Mixed glass
   - Aluminum Cans
   - Tin
   - Residue
6. At the completion of the ONP sort, sort crew members will need to sweep up materials inadvertently lying on the floor and place into the appropriate bins.
7. All ONP and mixed paper bins and the separated containers must be weighed and recorded. Once all the materials are weighed, the shrinkage numbers should be examined to see if it appears the weights are reasonable (i.e. within study norms and explainable).

Residential Vehicle Commingled Container Compartment - Sorted Over Containers Line

1. Commingled container loads can include mixed HDPE and PET plastic containers, aluminum and tin cans, glass bottles (clear, green, brown, and mixed), liquids (contained in bottles) and residue
2. Loads are pushed onto the in-feed conveyor belt by the front-end loader and conveyed to the overhead sorting platform. Towards the end of a run, someone should be assigned to sweep the leftover materials onto the conveyor to ensure the entire load is processed (materials inaccessible by front-end loader).
3. Commingled containers are conveyed through a trommel screen where small residue materials drop out into a small residue bin.
4. Materials pass under a magnet and collected ferrous metals are deposited into a cage-type bunker.

5. Materials pass through an air classifier (cyclone), where materials are divided by weight into a "heavies" component (mostly glass and liquid containing PET bottles) and a "lights" component (mostly plastic and aluminum containers).

Heavies

6. Sorters separate the glass by color (green, brown or amber, and clear) in to bins located below. The remaining glass (mixed color) will be conveyed off the end of the sort belt into a bin located below the platform
7. Additionally, PET bottles containing liquids are sorted into a separate container. Upon completion of the sort, the sort crew will need to empty the liquid from the containers into separate pitchers. Both the empty PET containers and the liquid will need to be weighed and recorded.

Lights

8. The remaining materials are conveyed over the platform sort line and mixed HDPE, PET, and aluminum cans are sorted off the line and placed in containers next to the sorters.
9. Residue falls off the end of the line into a large bin.
10. During the run, as they fill, the small mixed HDPE, PET and aluminum can containers, located next to the sort belt will be dumped over the platform into large bins below. This is an area where safety is critical; sorters must be careful in dumping these containers and no personnel should be allowed under the sorting platform during a run. In addition, if possible, one extra person should be made available for dumping duties so as not to take away from normal sorting procedures.
11. Sorting crews will need to pick up inadvertently dropped materials around the bins and place them into the appropriate bins for weighing
12. The forklift driver will then pick up each of the container bins and have the bins weighed.
13. Additionally, sort crew will need to remove ferrous materials from caged bunker and place them into rolling carts to be transferred to the scales and weighed.

14. All containers and bins are to be weighed and recorded. Once all the materials are weighed, the shrinkage numbers should be examined to see if it appears the weights are reasonable (i.e. within study norms and are explainable)

OCC Vehicle/Compartment

The single compartment OCC loads contain mostly OCC with some residue.

1. OCC compartment is dumped onto the floor.
2. Sorting crew separates out residues such as film plastics, etc. which are placed into a container and taken to the scales for weighing.
3. OCC is then pushed into an empty bunker by the front-end loader where it is baled. Bales are weighed and recorded.

Commercial Vehicle/Compartment

The single compartment commercial loads contain mostly mixed paper, cardboard and mixed containers, with some residue, and are sorted on the commercial line.

1. When commercial loads are scheduled, ensure there is a cleared area on the main tipping floor for the truck to dump.
2. Check the MRF commercial sort line to ensure that all containers and the conveyor are cleared from prior sorts.
3. Have the vehicle weigh on the in-floor truck scale fully loaded.
4. Accompany the truck to the main tipping floor and have them dump on to or as close to the in-feed conveyor (walking floor) if cleared and ready for sorting. If the in-feed is not readily available, have the vehicle dump its load in a clear area and mark the load with caution tape. Take care to ensure that it is not mixed with other loads on the tipping floor.
5. Inform the truck driver that they must re-weigh the vehicle after emptying the load.
6. The commercial load will be pushed onto the in-feed walking floor and conveyed through the commercial processing equipment (screens, sort line, etc.). OCC and mixed paper are picked off and deposited into chutes/bunkers for baling. Containers are also pulled off the line,

deposited into small containers and hand transferred to the scales for weighing at the end of the run. Materials that are not removed from the sort line are considered residue. This residue is not weighed. The amount of residue is calculated by subtracting the total weight of the recovered materials from that of the net truck compartment weight.

7. Once the sort is completed, sorters should separate containers in to the following categories:
   - HDPE
   - PET
   - Mixed glass
   - Aluminum Cans
   - Tin

   The container/bin filled with these materials are then weighed and recorded.

8. The OCC and mixed paper bunkers are run separately through the commercial baler. The bales are then weighed and recorded.
9. Shrinkage numbers should be analyzed at this time to see if the load seems reasonable
10. Residue from the commercial loads are not weighed. It is only calculated as accurate collection of residues is difficult with this processing line.

VI. Post-Field Sort Analysis

Aggregation of Data and Linkage to SMaRT Spreadsheet

1. Each individual data sheet (40 in total) will be aggregated and summarized in a final spreadsheet showing total weights and percentages by material type and truck compartment including residue and shrinkage.
2. Data will be aggregated by the six route types (3 per city) by truck compartment type.
3. Summarized spreadsheets will be provided for linkage to SMaRT Station materials reconciliation spreadsheet for representative distribution of revenues between the three cities.

Statistical Analysis of Data

The analysis will include calculations of the mean, standard deviation, and margin of error using a 90% confidence limit for each material type.

Table 1 | Recyclables Characterization Pre-Sort Checklist
Mixed Container Line

	Yes/No
Sorting deck clean	
Infeed area clean	
Bunkers taped off	
Ferrous (tin can) bunker clean	
Belts clean	
Containers/Bins emptied (see list below)	
Platform scale - Set Zero	
Container tare weights (see list below)	

	Size	Product	Tare weight (lbs)
Heavies Line - Floor	**4-yard**	**6**	
Pre-sort from belt	4-yard	Residue	
Under trommel	4-yard	3-Mix Glass	
Heavies sorting belt	4-yard	Flint glass	
Heavies sorting belt	4-yard	Brown glass	
Heavies sorting belt	4-yard	Green glass	
Heavies sorting belt - end	4-yard	3-Mix Glass	
Heavies Line - Sorting Deck	**32-gallon**	**3**	
Under trommel (on deck)	32-gallon	3-Mix Glass	
Next to sorters	32-gallon	recyclable containers with liquid	
Next to sorters	32-gallon	Residue	
Lights Line - Floor	**4-yard**	**4**	
Lights Line - Floor	**32-gallon**	**1**	
Cyclone	32-gallon	Residue	
Lights Line (floor behind sorters)	4-yard	PET	
Lights Line (floor behind sorters)	4-yard	HDPE	
Lights Line (floor behind sorters)	4-yard	Aluminum	
End of container line	4-yard	Residue	
Lights Line - Sorting Deck	**32-gallon**	**8**	
Sorting station	32-gallon	HDPE	No Tares Needed
Sorting station	32-gallon	HDPE	
Sorting station	32-gallon	PET	
Sorting station	32-gallon	PET	
Sorting station	32-gallon	Aluminum	
Sorting station	32-gallon	Aluminum	
Sorting station	32-gallon	Empty	
Sorting station	32-gallon	Empty	

Table 2 | Recyclables Characterization Pre-Sort Checklist
Fiber Line

	Yes/No
Sorting deck clean	
Infeed area clean	
Fiber bunkers clean	
Chutes not in use -- taped off	
Belts clean	
Containers/Bins emptied (see list below)	
Platform scale - Set Zero	
Container tare weights (see list below)	

	Size		Tare weight
Floor - Sunnyvale Fiber and Mountain View Newspaper Compartments	**6-yard yard**	**8-4 1**	
Positive sort bunker	6-yard (2)	OCC	
Positive sort bunker	6-yard (2)	Mixed Paper	
Negative sort bunker	8-yard (1)	Newspaper	
Sorting Deck - Sunnyvale Fiber and Mountain View Newspaper Compartments	**32-gallon**	**8**	
Sorting station	32-gallon	Mixed Containers	No Tares Needed
Sorting station	32-gallon	Mixed Containers	
Sorting station	32-gallon	Mixed Containers	
Sorting station	32-gallon	Residue	
Sorting station	32-gallon	Residue	
Sorting station	32-gallon	Residue	
Sorting station	32-gallon	Empty	
Sorting station	32-gallon	Empty	

Table 3 | Recyclables Characterization Pre-Sort Checklist
MRF Line

	Yes/No
Sorting deck clean	
Infeed area clean	
Bunkers clean	
Belts clean	
Containers/Bins emptied (see list below)	
Platform scale - Set Zero	
Container tare weights (see list below)	

Bunkers - Two Required for Mixed Paper and OCC Materials -Feed Directly to Baler

Positive sort bunker	Live Floor Bunker	OCC
Positive sort bunker	Live Floor Bunker	Mixed Paper

Sorting Deck - Mt View Commercial Loads

	32-gallon	**11**
Sorting station	Two 32-gallon	Tin
Sorting station	Two 32-gallon	PET
Sorting station	Two 32-gallon	HDPE
Sorting station	One 32-gallon	Aluminum
Sorting station	Four 32-gallon	Mixed Glass

No Tares Needed

Appendix C

Smart Station Source Separated Materials Characterization Study Training Manual Spanish

Manual de Capacitación para Estación *Smart* Caracterización de Materiales Separados

I. Introducción

El propósito del estudio es caracterizar los materiales separados en la fuente entregados a la Estación SMaRT para determinar más efectiva y consistentemente la asignación de ingresos entre las ciudades de Mountain View, Palo Alto y Sunnyvale.

II. Preparaciones para Clasificación Pre-Campo

Determinación del Número de Muestras

1. Emplear los Lineamientos de California para Residuos Sólidos Industriales para determinar el número de muestras conforme se aplican (CIWMB recomienda 15 a 50 muestras dependiendo del estudio y tipo de población).
2. Basado en el número y tipo de rutas y total de toneladas en 2003, se tomaron 20 muestras por ciudad para un total de 40 muestras.

Coordinación de Transportista Contratado

Es necesario tener una reunión con transportistas contratados al principio del proceso para asegurar un estudio efectivo y eficiente; resumir las responsabilidades del transportista contratado.

1. Se debe colectar una lista de rutas con tipo de cargamento, día para recoger, números de ruta, números de camión, y números SMaRT.
2. También se necesita un mapa de todas las rutas, por día, que exhiben las áreas geográficas en donde se recoge.
3. El equipo administrativo y transportistas contratados trabajarán para desarrollar una gráfica de rutas y días que se necesitan identificar para el estudio.
4. Los transportistas contratados y el equipo administrativo debe trabajar con los choferes de vehículos y operadores de la cabina de básculas para asegurar que el vehículo de colección es la ruta correcta, el tiempo

de entrega es preciso, y que los vehículos usan los procedimientos apropiados de báscula.

Selección Muestra

1. Es de gran importancia tener una muestra representante y directamente proporcional de las rutas normales de camiones en ambas ciudades.
2. Revisar las listas y mapas de las rutas de cada transportista exhibiendo el número de rutas normales incluyendo el tipo (p.ej., residencial, comercial, OCC) y cobertura geográfica.
3. Calcular el número de cargas muestras por tipo de generador entendiendo el porcentaje de cada tipo de ruta. Por ejemplo, si una ciudad tiene un total de 100 rutas y 45 de ellas son residenciales, 45% del cargamento muestra deben ser muestras residenciales. Usando el caso base de 20 cargamentos, 45% equivaldrían a 9 rutas residenciales, el redondeo de estos cálculos será necesario como un número "entero" de muestreo (p.ej., para cargamentos MF de Sunnyvale, aproximadamente 19% del total de las 20 muestras se calculo a 3.75 muestras que se requieren ya que esto no es posible, 3.75 se redondeo al numero "entero" 4).
4. Seleccionar aleatoriamente las cargas diarias que son del tipo y número que se requiere (ver párrafos anteriores) y que dan representación geográfica; la selección aleatoria se lleva a cabo de la siguiente manera:

   Los mapas de rutas se colectan de cada transportista; los transportistas cubren un área geográfica diferente cada día. Si se requieren dos rutas residenciales de un área que cuenta con 6 que corren el mismo día, se deben seleccionar dos de manera aleatoria. Para hacer esto, tomar la lista diaria de rutas y números de rutas poner un 1 a 6 enseguida de cada uno de los seis números de ruta para cada día. Usar el generador de numero aleatorio en *MS Excel.* A la función se le llama RAND. Si hay 6 posibles selecciones de rutas, multiplicar el numero aleatorio numero de generador por 6 (p.ej.,= RAND*6). Asegurarse de que formatea la celda referenciada a cero lugares decimales. El generador del número aleatorio seleccionará una de las rutas 1 a 6. Para la segunda opción, sencillamente volver

a calcular en *MS Excel* al presionar F9, le producirá la segunda opción aleatoria.

Logística de Muestreo

El equipo administrativo, equipo de clasificación, y contratista deben tener una reunión inicial para determinar el mejor plan de acción para reducir de manera mas efectiva el impacto de las operaciones diarias. La logística de muestreo que se sugiere incluye:

1. Dos semanas (10 días hábiles) para llevar a cabo el muestreo de 40 cargas; promedio de 4 cargas por día.
2. Se calcula una hora por carga para clasificar, pesar y registrar.
3. Coordinación con transportistas contratados para retener las cargas durante la noche y entregarlas a la siguiente mañana, si es necesario.
4. Las muestras de estudio se deben programar para entregarse antes de que empiecen las operaciones normales cotidianas.

Equipo de Ensamble

1. El equipo debe consistir del mismo numero de clasificadores que desempeñan las operaciones cotidianas, de preferencia el equipo que desempeña esta función a diario.
2. Se debe programar y organizar al equipo por medio de discusiones con el representante administrativo para el procesador del contrato; el administrador del contrato necesita asignar a un administrador responsable de su equipo para toda la coordinación diaria directa.
3. Se requieren tres gerentes en los puestos a continuación: 1) manejar el peso y datos de entrada en las básculas; 2) manejar operaciones en el piso, y 3) manejar operaciones arriba en las plataformas de clasificación.

Capacitación del Equipo de Muestreo

1. Los materiales para capacitación deben distribuirse en español e ingles antes de la capacitación,.